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Notes on Marine Algae Collected in Guinea-Bissau, Tropical West Africa

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A total of 15 taxa of marine benthic algae from Guinea-Bissau are identified, namely 3 in the Chlorophyceae, 5 in the Phaeophyceae and 7 in the Rhodophyceae. All of these are new records for Guinea-Bissau.

Introduction

In February 1993, seaweeds were collected by Dr Theunis Piersma (Netherlands Institute for Sea Research, Den Burg, Texel) during his stay in Guinea-Bissau. Because the main reason for his visit was to study migrating coastal wetland birds, the collection of seaweeds is just a small one. The algae were collected from the offshore islands of the Arquipélago dos Bijagós (Fig. 1), namely on the intertidal flats southwest of Ilha de Rubane and northeast of Ilha de Maio. The algae collected on Ilha de Rubane were from rocks of a small stony coastal area between sandy tidal marshes, those collected on Ilha de Maio were attached to fragments of shells found on sandy tidal marshes. At both locations the tidal range is 3–4 meters. The algae were collected about mid-way between high tide and low tide levels. Lawson and John (1987) could not trace records of any marine alga from Guinea-Bissau, so the marine algae reported in this paper are all considered as new records for this part of the tropical West African coast.

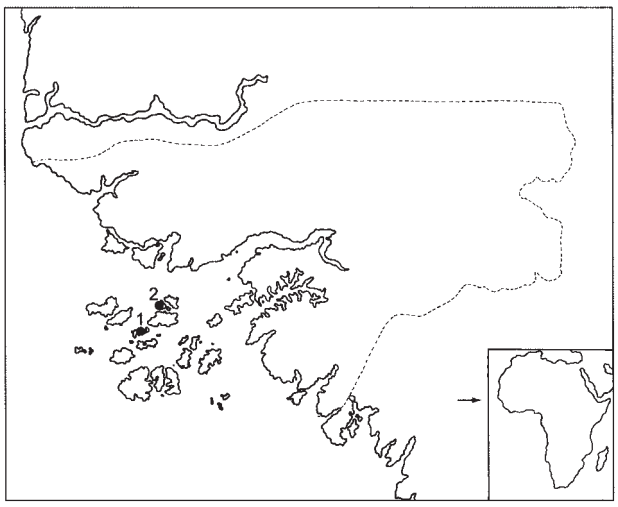

Fig. 1. Map of Guinea-Bissau, showing the location of the two collecting stations. Inset: map of Africa indicating the position of Guinea-Bissau.

Material and Methods

The seaweed samples have been preserved in 4 % formaldehyde solution in seawater and have been recently dried on paper. They are deposited in the Nationaal Herbarium Nederland in Leiden, The Netherlands. Slides were made by hand, using a razor blade, and by a sliding freezing-microtome.

Before making slides, the dried specimens were soaked in detergent for 15 minutes. Slides were made initially using 20 % Karo and then preserved with 80 % Karo.

The stations where the algae were collected are: Station 1: Ilha de Rubane, 11 °20'N 15 °49'W, Date: 18–20 February 1993; Station 2: Ilha de Maio, 11 °34'N 15 °57'W, Date: 22 February 1993.

The species in the annotated list are given in alphabetic order within the divisions Chlorophyta, Heterokontophyta (class Phaeophyceae) and Rhodophyta. Authors' names are given in standardised form (Brummitt and Powell 1992). A short description of the thallus, presence of fructification and reproductive structures is given when relevant. References are given for each species as well as the station number(s) where they were found. For their known occurrence in (tropical) West Africa (T) and northern (subtropical) West Africa (S) references are also given.

Most species have been compared with material from the collections of the Nationaal Herbarium Nederland (Universiteit Leiden branch).

Results: List of Species

Chlorophyta

Chaetomorpha crassa (C. Agardh) Kütz.
Filaments were entangled. Cells were about 200 µm in diameter and 300–600 µm in length, from 1.5 to more than 3 times longer than broad.
Reference: John *et al.* 2001: p. 22.
Station 1.
T: Lawson and John 1982.

Cladophoropsis membranacea (C. Agardh) Børgesen
Diameter of the main branches was about 150 µm. The specimen was lost during the first identification and it was therefore not possible to re-check the identification at a later date.
Station 1.
T: Lawson and John 1982; S: Kooistra *et al.* 1992.

Enteromorpha intestinalis (L.) Nees
Fronds were unbranched, length up to 6 cm. Cells were 7.5–18 µm in diameter, irregularly arranged throughout; angular or polygonal in surface view.
Reference: John *et al.* 2001: p. 31.
Station 1.
T: Lawson and John 1982; S: Lawson and John 1977.

Heterokontophyta: class Phaeophyceae

Colpomenia sinuosa (Roth) Derbès *et* Solier
Five specimens were collected. They were 1–3 cm in diameter. There were 3–4 layers of medullary cells and 2 layers of cortical cells. Inner cells were up to 180 µm in diameter. Surface cells were angular, 3–7 µm across in surface view. Punctuate sori were observed.
References: Clayton 1975: p. 187–195; John *et al.* 2001: p. 42; Parsons 1982: p. 291–293.
Station 1.
T: Lawson and John 1982; S: Price *et al.* 1978.

Dictyota dichotoma (Huds.) J.V. Lamour. *var. dichotoma*
Two specimens were found. They were 5 cm and 22 cm in height. Branching was dichotomous. Branches had smooth and entire margins. On these margins, proliferations were observed.
References: De Clerck 1998: p.52; Hörnig *et al.* 1992a: p. 47; Hörnig *et al.* 1992 b: p. 399–401; John *et al.* 2001: p. 43.
Station 1; Station 2.
T: Lawson and John 1982; S: Price *et al.* 1978.

Feldmannia indica (Sond.) Womersley *et* A. Bailey Fig. 2
Filaments were 15–22 µm in diameter. Cells of filaments were 35–75 µm in length, 3–5 times longer than broad. Branches were irregularly and sparingly divided. Intercalary growth zones were observed. Plurilocular sporangia were sessile or with a one-celled pedicle. They were divaricate with small angles, 66–146 µm in length, 22–29 µm in diameter and 3–6 times longer than broad, cylindrical and with a rounded tip.
References: John *et al.* 2001: p. 46; Kuckuck 1963: p. 377; Trono 1997: p. 98.
Station 1.
T: Lawson and John 1982; S: Marcot-Coqueugniot 1991.

Sargassum acinarium (L.) Setch. Fig. 3
Two specimens were found, about 20 cm long. Leaf-like appendages were up to 5 cm in length and 1–5 mm broad. Receptacles were present and abundant in the specimen collected at Station 1.
References: Grunow 1916: p. 153; Turner 1808: p. 110.
Station 1; Station 2.
T: Price *et al.* 1978 ; S: Price *et al.* 1978.

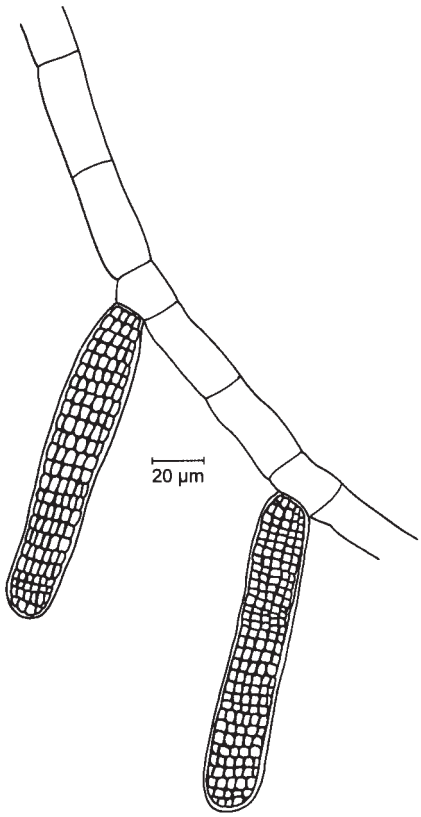

Fig. 2. *Feldmannia indica*: filament with plurilocular sporangia.

Sargassum ramifolium Kütz.
Synonym: *S. cymosum* J. Agardh var. *ramifolia* (Kütz.) Grunov
One specimen was found, about 5 cm high. Leaf-like appendages were 1–1.5 mm broad and dichotomously branched. Branching narrowed at the bases, slightly widening towards the top. Cryptostomata were observed on the filiform leaf-like appendages. The leaf-like appendages of *S. desfontainesii* (Turner) C. Agardh are repeatedly branched and more filiform.
References: Afonso-Carrillo and Sansón 1999: p. 107; Børgesen 1925: p. 105–106; Grunow 1916: p. 48, 136–137, 141; Kützing 1861: t.32 and t.35.
Station 1.
S: Marcot- Coqueugniot 1991.

Rhodophyceae

Acanthophora spicifera (Vahl) Børgesen
Specimens were to 11 cm in height and tetrasporangia were present.

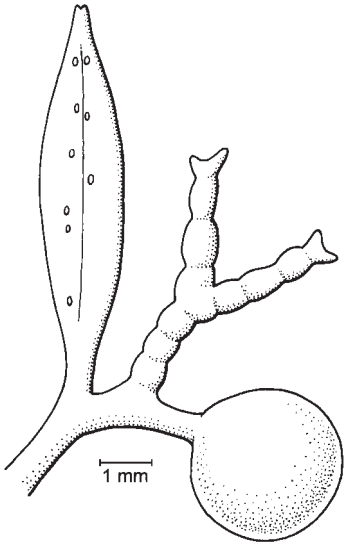

Fig. 3. *Sargassum acinarium*: detail with leaf-like appendage, reproductive structure (receptaculum) and air vesicle.

References: De Jong *et al.* 1999: p. 231–235; John *et al.* 2001: p. 58.
Station 1; Station 2.
T: Lawson and John 1982; S: Price *et al.* 1986.

Chondracanthus acicularis (Roth) Fredericq
Synonym: *Gigartina acicularis* (Roth) J.V. Lamour.
Branches had a distinct apical cell, were cylindrical and 250–440 µm in diameter. Only a very small, sterile fragment was found. This specimen was lost during the first identification and it was not possible to check it by a second examination.
Station 1.
T: Lawson and John 1982; S: Price *et al.* 1988.

Gracilaria cf. *verrucosa* (Hudson) Papenfuss Fig. 4
Only a small fragment, 4.5 cm in length was found. Branches were 225–315 µm in diameter. No cystocarps were observed.
Reference: John *et al.* 2001: p. 92.
Station 1.
T: Lawson and John 1982; S: Price *et al.* 1988.

Hypnea musciformis (Wulfen) J.V. Lamouroux
Plants were about 20 cm tall and branches were 360–580 µm in diameter. Reproductive organs were observed consisting of stichidia containing tetrasporangia.
References: John *et al.* 2001: p. 104; Stegenga *et al.* 1997: p. 334.
Station 1; Station 2.
T: Lawson and John 1982; S: Price *et al.* 1992.

Hypnea spinella (C. Agardh) Kütz.
Branches had distinct apical cells and were terete and 90–170 µm in diameter. Small, irregularly branched sterile plants (up to 1 cm high) were found. Cortex cells were angular in surface view, 7–18 µm in diameter and irregularly arranged.

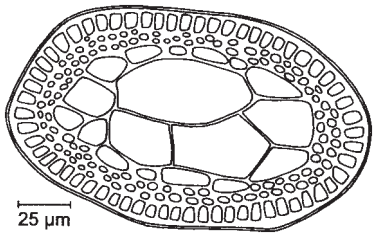

Fig. 4. *Gracilaria* cf *verrucosa:* cross-section of a branch.

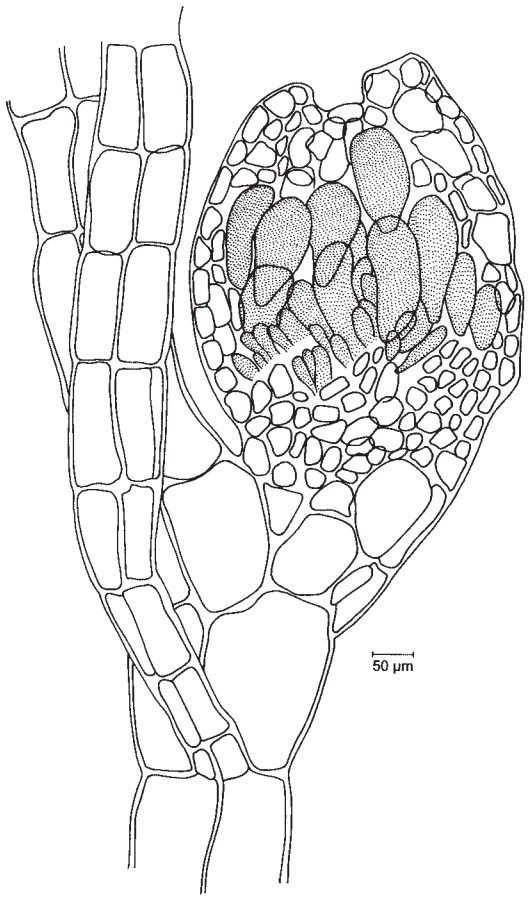

Fig. 5. *Polysiphonia* sp.: filament with cystocarp and carpospores.

References: Haroun and Prud'homme van Reine 1993: p. 121; John *et al.* 2001: p. 104.
Station 1.
T: Lawson and John 1982; S: Price *et al.* 1992.

Polysiphonia sp. Fig. 5
Erect branches had 4 pericentral cells and were ecorticate. Segments of erect branches were about 190 µm in diameter; slightly shorter than broad, to 1.75 times longer than broad. Central cells were much smaller than pericentral cells. Cystocarps were shortly stalked, globose, with a short ostiole. Tetrasporangia were spirally arranged. Since there were no rhizoids observed, identification was difficult. A possible identification was *Polysiphonia stricta* (Dillwyn) Grev.*;* however, the pericentral cells were not heli-

coidally arranged and the cystocarp observed was not urceolate. Other possibilities are: *P. incompta* Harvey, a South-African endemic species or a narrow form of *P. ferulacea* Suhr or *P. devoniensis* Maggs *et* Hommersand.
References: Feldmann 1981: p. 71–75; John *et al.* 2001: p. 122; Maggs and Hommersand 1993: p. 322–325; Stegenga *et al.* 1997: p. 547–548.
Station 1.

Polysiphonia denudata (Dillwyn) Grev. *ex* Harv. Fig. 6
Synonym: *Polysiphonia variegata* (C. Agardh) Zanardini
Erect branches had 7 pericentral cells and were ecorticate. Segments of erect branches were about 300 µm in diameter, nearly equal in length and breadth to 1.5 times longer than broad. Cystocarps were shortly stalked, globose, with a small short ostiole. Tetrasporangia were spirally arranged. Børgesen (1930, pp. 96–98) as well as Afonso-Carrillo and Sansón (1989, p. 36) recorded an unidentified *Polysiphonia* with 7 pericentral cells from the Canary Islands.
References: Feldmann 1981: p. 75; John *et al.* 2001: p. 7 ; Maggs and Hommersand 1993: p. 319.
Station 1.
T: Lawson and John 1982; S: Lawson *et al.* 1995.

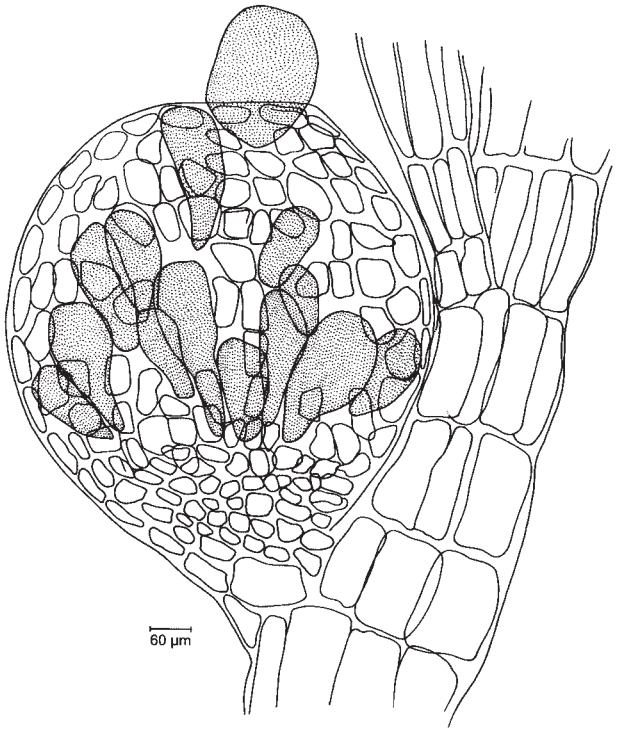

Fig. 6. *Polysiphonia denudata*: filament with cystocarp and carpospores.

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